



The Kansas City Field Station, 1950–1973

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The Kansas City Field Station (KCFS) was a major field installation of the Centers for Disease Control and Prevention (CDC) for many years, particularly known for its contributions to the epidemiologic studies of histoplasmosis, a fungus infection which is endemic in the Mississippi Valley. KCFS was located on the University of Kansas Medical Center (KUMC) campus and was integrated as part of the Medical Center. KCFS was shut down as a consequence of the federal budgetary crunch of 1973.

Because of its prominence in the history of epidemiological research on histoplasmosis and other infectious diseases, I was motivated to write a brief historical account of the Field Station and record some of its significant contributions to epidemiology and public health.

Origin of KCFS

In the 1940s, the US Public Health Service's (PHS) Tuberculosis Control Division established a unit at KUMC's Hixon Memorial Laboratory to conduct studies of tuberculin

and histoplasmin skin test reactions. In 1944 Michael L. Furcolow, later the first Chief of KCFS, was assigned to this unit, working under the direction of Carroll E. Palmer, who was conducting a histoplasmin skin test survey on over 10,000 student nurses in widely separated areas in the United States, including Kansas and Missouri. In 1945, Furcolow initiated an extensive epidemiological study of tuberculin and histoplasmin skin test sensitivity in Kansas City, Missouri, where he found that 78.5% of adult males and 53.8% of adult females had positive

histoplasmin skin reactions. The CDC was formed in 1946, with headquarters in Atlanta, Georgia. In 1949, the Midwestern CDC Services was established in Kansas City, Missouri, primarily to conduct investigations of mosquito-borne encephalitis. A year later, Furcolow was transferred from the Tuberculosis Control Division to the Midwestern CDC Services to head up the Investigation Section. Subsequently, this Section was expanded to become KCFS, which was housed in a Quonset hut located on the KUMC campus.



KCFS personnel examine a child during an outbreak of bubonic plague, Central Java, 1968

Chronicles

Michael L. Furcolow, First Chief of KCFS

Furcolow received his MD degree from Yale University Medical School in 1934. Upon completion of his clinical and fellowship training in 1938, he entered PHS as a Commissioned Officer. His first assignment was at the National Institutes of Health (NIH), where he researched the tuberculin skin test. In 1941, he published a landmark paper that contributed important information on the sensitivity of the test.¹ His interest in the tuberculin test led him to the study of the histoplasmin skin test and its significance in histoplasmosis.

Histoplasmosis

Histoplasmosis is widely distributed in many parts of the world, particularly in major river valleys. In the United States, the infection is highly prevalent in the central river valleys along the Mississippi, Missouri, and Ohio Rivers. In these areas, the prevalence of positive histoplasmin skin tests ranges from 70% to 90% of the population. The disease occurs in localized outbreaks, most frequently in endemic areas, but it may also occur outside the known endemic areas. Interestingly the first outbreak of histoplasmosis was observed in 1938 in Plattsburgh, New York, a nonendemic area.²

Histoplasmosis is caused by inhalation of the spores of *Histoplasma capsulatum*. When Furcolow was assigned to KCFS in 1950, little was known about its epidemiology. The first paper establishing *H. capsulatum* as a cause of epidemic pulmonary disease was published in 1952 by Loosli et al.,³ who isolated *H. capsulatum* from a patient and from soil samples taken from a silo.

One of the authors of this paper was J. Thomas Grayston, who was assigned to KCFS in 1951 as an Epidemic Intelligence Service (EIS) officer. In 1953, Furcolow and Grayston reviewed 13 epidemics of histoplasmosis and reported on their etiologic and epidemiological observations.^{4,5} Of a total of 116 people involved in 11 of these outbreaks, they performed histoplasmin skin tests on 94, all of whom had positive reactions. Most had high antibody titers to histoplasmosis. Soil samples from seven of these outbreaks yielded *H. capsulatum*.

One of the most intriguing epidemics of acute pulmonary disease mentioned in Furcolow and Grayston's review occurred among soldiers at Camp Gruber, Oklahoma.⁶ In 1944, 27 soldiers were hospitalized with an unusual form of pneumonia following exposure to dust in an abandoned storm cellar. Extensive laboratory studies conducted at the time of the epidemic did not reveal a specific agent. Not until about 10 years later was the Camp Gruber epidemic shown to be caused by *H. capsulatum*. The evidence was based on follow-up serological studies performed at the Rocky Mountain Laboratory in Hamilton, Montana, in collaboration with KCFS.⁷ Larsh and Furcolow of KCFS isolated *H. capsulatum* from soil samples collected from the storm cellar and clinched the source of the outbreak.⁸

The localized nature of histoplasmosis outbreaks suggested that *H. capsulatum* is limited geographically by certain environmental conditions.⁹ In addition to proper humidity and temperature, enrichment of soil by chicken, pigeon, or other bird droppings is essential for the growth of the organism. In the 1950s, many cases of acute pulmonary histoplasmosis seen at the University of Kansas Hospital were among farmers who had shoveled manure in old chickenhouses or

people who had visited farms. These observations indicated that chicken manure was an important source of *H. capsulatum*. Some epidemics were associated with shoveling pigeon manure. However, the role of other birds such as blackbirds, starlings, and grackles in the epidemiology of histoplasmosis had not yet been delineated.

The first epidemic that clearly established the important role of blackbirds (including starlings and grackles) in the epidemiology of histoplasmosis occurred in Mexico, Missouri, in 1959.¹⁰ The site of this epidemic was the city park. Ten Boy Scouts were reported to have acute pulmonary histoplasmosis. Investigations indicated that the epidemic was caused by dust created by the Scouts as they raked leaves and debris into piles, which were subsequently burned. (The park was a favorite roosting place for thousands of starlings, and their droppings almost completely covered the ground. Because of the noise and the unpleasant odor, the city had embarked on an eradication program.) Of the 64 Scouts who participated in the clean-up, 97% had positive histoplasmin skin tests, compared with 41% of 46 boys who did not work in the park. *H. capsulatum* was isolated from 62% of 56 soil samples collected from different parts of the park. This and subsequent epidemiological studies by Field Station personnel provided strong evidence that old starling roosting areas are important sources of epidemics of histoplasmosis, particularly in urban communities.^{11,12} In one of the outbreaks, 3% formalin solution was found to be effective for decontaminating the soil.¹³

Organization of KCFS

By the time I joined KCFS in 1954 as an EIS officer, Furcolow was well on the way to acquiring his

reputation as "Mr. Histoplasmosis." KCFS by then was organizationally under the Epidemiology Branch of CDC in Atlanta. That same year, six other EIS officers were assigned to KCFS. These included a physician, two nurses, a veterinarian, and two statisticians. Thus the staff grew considerably that year. The Quonset building was quite spacious. About two-thirds of the space was used for offices, a conference room, a clinic, and a reception area, and the other one-third was for laboratories. The laboratories were directed by Howard W. Larsh, Chairman of the Department of Plant Sciences, University of Oklahoma, Norman, who had been associated with the Field Station since 1950 as Special Consultant in Medical Mycology.

The Role of KUMC

The relationship between KCFS and KUMC was rather unique. Not only was KCFS physically part of KUMC, its activities were interwoven with those of the Medical Center. Furcolow and some of the EIS officers had faculty appointments. All Medical Center facilities were open to Field Station personnel. KCFS was a resource for clinical and laboratory consultations, particularly in the area of systemic mycotic infections. Collaborative research was developed with investigators in a number of departments. The Virus Research Laboratory, headed by Herbert A. Wenner, Research Professor of Pediatrics and an internationally known virologist, was an invaluable resource for epidemiological studies of viral infections.

Outbreak Investigations

The EIS officers assigned to the Field Station played an important role in epidemiological investigations. From 1951 to 1973, a total of 70 EIS officers were assigned to KCFS and

its Ecological Investigations Program, formed in 1966. Their primary responsibilities were to provide epidemic assistance to health departments in the Midwestern states or elsewhere upon request.

In September 1954, Furcolow and I were asked to investigate an outbreak of central nervous system disease in Hidalgo County, Texas, near the Mexican border. It turned out to be an extensive outbreak of St. Louis encephalitis, the largest since the one that had occurred in the St. Louis area in 1938. *Culex quinquefasciatus* was shown to be the mosquito vector; it had not been demonstrated previously as a transmitter of St. Louis encephalitis virus under natural conditions.¹⁴ It was also shown that inapparent infection was common, perhaps as high as 70% of infected people.¹⁵

In 1955, we investigated an outbreak of polio-like illness in Marshalltown, Iowa. Investigations indicated that this was an outbreak of aseptic meningitis¹⁶ caused by Echovirus type 4.¹⁷ This was the first major outbreak of Echovirus type 4 meningitis encountered in the United States.

In 1956, another outbreak of aseptic meningitis was reported from Mason City, Iowa. Investigations indicated that the etiologic agent was Cocksackievirus type B5.¹⁸ Surveillance conducted by KCFS personnel indicated that the virus caused widespread outbreaks of aseptic meningitis in Iowa, Nebraska, Kansas, and Missouri.¹⁹ This was the first encounter with Cocksackie B5 virus causing such extensive epidemics of aseptic meningitis in the US.

The aseptic meningitis surveillance activities implemented by KCFS and Wenner's Virus Research Laboratory also led to the discovery of a new echovirus. In 1955, a cytopathogenic agent was recovered in a fecal specimen obtained from a six-year-old boy with aseptic menin-

gitis. This new agent, initially designated as Caldwell virus, is now classified as Echovirus type 31.²⁰

Epidemiologic and Clinical Research

In December 1960, KCFS moved into a newly built modern building about two blocks from the Quonset hut. Furcolow retired in June 1964, and I became Chief of the Station. The new building had excellent laboratory and animal facilities, and many of the studies conducted by the EIS officers yielded new and important epidemiological information. Particularly notable were the longitudinal studies of herpes simplex virus infection in children²¹ and the studies of cytomegalovirus (CMV) as a cause of mononucleosis²² and its possible transmission by the venereal route.²³ Seroepidemiologic studies of CMV in nuns provided further insight on the probable sexual transmission of this virus.²⁴

KCFS provided ample opportunities for clinical research as well. In 1957 a paper was published describing the treatment of 60 cases of deep mycotic infections with seven antifungal drugs.²⁵ This was one of the earliest reports on the use of amphotericin B for treating histoplasmosis and other systemic mycotic infections. Papers describing the treatment of chronic pulmonary histoplasmosis with amphotericin B²⁶ and the long-term follow-up of 54 cases of treated and untreated disseminated histoplasmosis²⁷ were landmark publications.

In 1966, David Sencer became Director of CDC. One of his major goals was to reorganize and upgrade the operations of the CDC field stations scattered across the country: KCFS, Greeley Field Station in Colorado, Phoenix Field Station in

Arizona, Savannah Field Station in Georgia, the Plague Field Station in San Francisco, and San Juan Field Station in Puerto Rico. All but Savannah were placed under the new Ecological Investigation Program (EIP). KCFS became the headquarters for this program, with myself as Director. To accommodate the headquarters operations and expanding program activities, an annex was added to the existing KCFS building.

KCFS's Legacy

Over a period of 23 years, KCFS made many important contributions to epidemiology and public health. It was a major center for the study of histoplasmosis and other systemic mycoses. It developed an extensive network with state health departments for surveillance of communicable diseases in the Midwest. EIS officers were assigned to the Station for epidemiologic training and to provide epidemic assistance to the states. The availability of excellent laboratories provided these EIS officers opportunities to conduct laboratory as well as field investigations, thus enhancing their productivity. Since the station was located on the KUMC campus, opportunities were available for patient contact, teaching, and development of collaborative research with the faculty. The EIS and EIP officers (totaling 89) contributed significantly to the success of the Field Station. A significant number of them remained as PHS career officers, and many chose careers in preventive medicine, public health, or related disciplines.

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